SAFE INFRASTRUCTURE WORKSHOP

Introduction to Theme 3

>> Rail Inspection Technologies <<

- Key types for rail breaks
- Defect characterization – improvements needed

Situation

The railway still is the safest transportation mode. Due to increasing Economical and technical requirements existing safety margins are steadily being diminished. Therefore database & know-how to define and manage safety and maintenance limits become more and more important.

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Fraunhofer Institut Werkstoffmechanik

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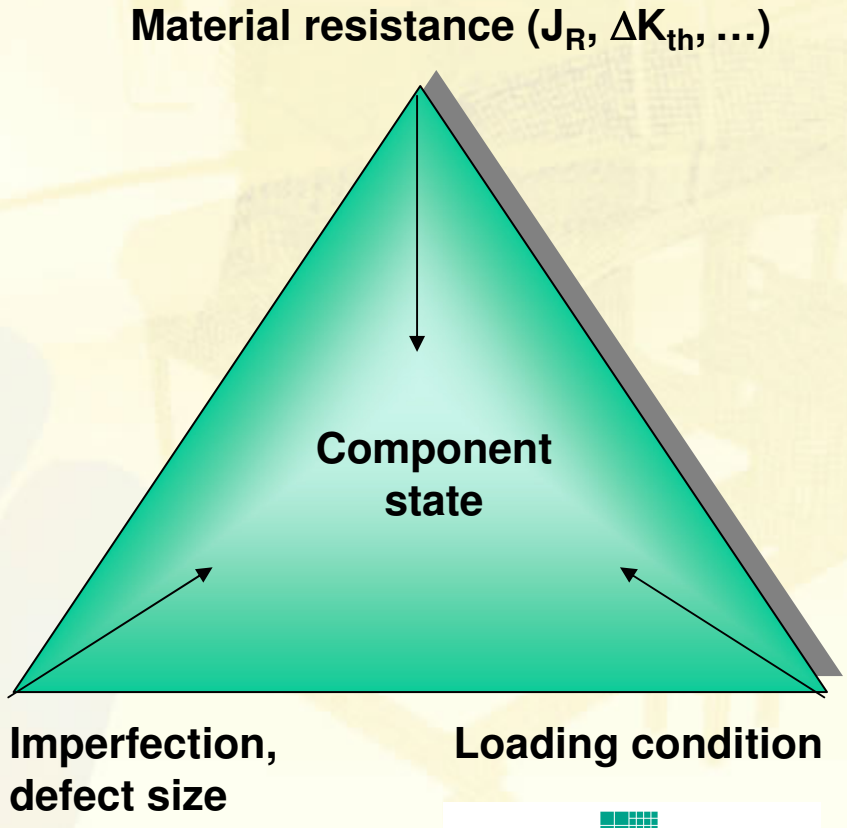
- rail inspection delivers the database upon which maintenance actions are planned in order to secure the
  - safety &
  - quality

  of the wheel rail interface
- to reliably assess the component state, sufficient details regarding its loading condition, material resistance and defect state are needed.
- up to date procedures for the remaining rail life assessment still contain missing links



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Key types for rail breaks

Today rail breaks mainly originate from:

a. Weldments - Maintenance (highest percentage)
(appropriate process parameters applied, sufficient quality control, …?)

b. Contact surface – Operation (increasing relevance)
(contact conditions, rolling contact fatigue & wear behavior known, …?)

c. Internal flaws, residual stresses – Manufacturing
(metallurgy, rolling process stable…?)

Despite differing operational details basically identical for every railway

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Defect characterization – improvements needed

subject:	weldments, internal flaws
aim:	• detection of defects in any position of the rail regardless of angle • determination of defect size and orientation
suggestion:	improved vehicle mounted / manual ultrasonic testing ?
subject:	contact surface
aims:	• detection of rolling contact fatigue defects (head checks, squats..) • determination of defect size and depth • quality control of maintenance work performed (to what extent have defects been removed?)
suggestion:	improved vehicle mounted / manual eddy current testing ?

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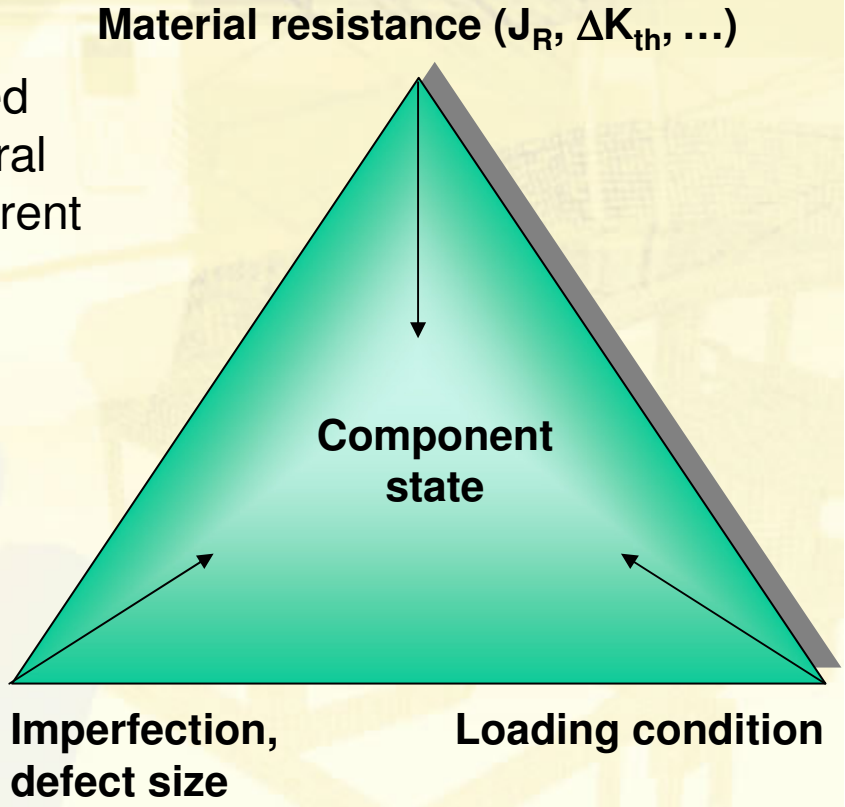
Important additional input

- loading conditions, regularly determined through measurements of vertical, lateral and longitudinal contact forces for different line categories
- relevant material characteristics



R&D target

development of evaluation modules capable to:

- consider varying service conditions
- predict remaining rail service life
- assess the risk of rail breaks
- support maintenance decisions - technically and economically

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